Title: SEAGRASS DERIVED DISSOLVED ORGANIC MATTER IN FLORIDA BAY: MOLECULAR BIOGEOCHEMISTRY AND MICROBIAL BIOAVAILABILITY.

Principal Investigator: Rudolf Jaffé
Southeast Environmental Research Center (SERC)
OE-148
Florida International University
Miami, FL 33199
305-348-1256
jaffer@fiu.edu

Co-Investigator(s): Joseph Boyer
Florida International University

James Fourqurean
Florida International University

Nagamitsu Maie
Florida International University

Project Summary: Surface water samples from Florida Bay exhibit an elevated amount of non-humic, protein-like material compared to the freshwater Everglades waters. Our previous chemical characterization efforts in Florida Bay (funded by NOAA to Jaffé) clearly show that a significant portion of the DOM in Florida Bay is not associated with freshwater inputs from the Everglades. This suggests that a much of the bioavaible, protein-like materials in Florida Bay are derived from autochthonous sources. We believe the source of this autochthonous DOM is most likely to originate from the seagrass/benthic community. The exact source, source strength and bioavailability of this autochthonous DOM in Florida Bay need to be determined in order to assess the potential contribution to the microbial loop.

This research project will focus on determining the importance of autochthonous DOM production by providing (1) molecular descriptions of DOM over both spatial and temporal domains in the bay, (2) detailed characterizations of the DOM contributed by seagrass beds, and (3) evaluations of the bioavailability of the DOM produced by the seagrass communities in Florida Bay.

We will use field enclosures to directly measure the rate of release of DOM and nutrients from the seagrass community, the chemical characteristics, and the bioavailability of this DOM. We will measure the release rates from both healthy seagrass communities and from areas of recent sulfide-induced seagrass mortality. During the second

year we will induce seagrass mortality by dosing the enclosures with sulfide and measure release and processing of the DOM.

This study will produce the first complete data set regarding the molecular composition and bioavailability of DOM (DOC and DON) of Florida Bay and an assessment of the production rate of such materials from local seagrass beds. We will also estimate the contribution of seagrass die-off in the 1980's to DOM and nutrient flux from seagrass communities. As such, this study will be a significant contribution to the better understanding of the biogeochemical processes that control the dynamics of DOM and to what extend this autochthonous DOM fuels the microbial loop in sub-tropical, seagrass-dominated estuaries.

Relevance to Restoration and/or Resource Management:

Although it was originally thought that the bulk of DOM in Florida Bay was of terrestrial origin, our previous work has shown that a significant amount is derived from seagrass. Thus, it is possible that some phytoplankton blooms may be a result of changes in DOM inputs from the seagrass community during dieoff events.

Both the quantity as well as the quality (microbial bioavailability) of seagrass-produced DOM should be evaluated in order to accurately predict DOM's potential influence on water column primary productivity. This is especially important given potential changes to freshwater input (volume and distribution) as a result of the Comprehensive Everglades Restoration Plan.

Geographic Area: Florida Bay.